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AGENCY

INSIGHT



In this issue:
All the goods on dangerous
goods packaging

Enhancing safety through new legislation

This month, we take a detailed look at dangerous goods packaging. While we cannot possibly provide a comprehensive guide to such a highly technical subject matter, we do deliver a general overview and an update on current developments. More information about dangerous goods packaging can be obtained from the Coordination and Information Centre at Alberta Public Safety Services, 1-800-272-9600 toll-free in Alberta, 422-9600 in Edmonton.

Inclusion of packaging requirements into the Transportation of Dangerous Goods legislation has been long and eagerly awaited by government and industry alike.

In this issue, we have asked representatives from regulatory bodies and industry to express their views on the inclusion of hazardous goods packaging standards in legislation, and on related issues. This approach seems to have strong appeal, judging by what our writers have to say.

A specialty chemical manufacturer from Ontario, Nalco Canada Inc., supports the introduction of uniform standards and regulations that will apply to the packaging of all classes of dangerous goods. John Pegg and R.D. Jensen, senior executives with the firm, write that Nalco already chooses its containers for road transport on the basis of packing rules outlined in the regulations for rail transport.

They explain that new amendments to TDG regulations will lead to the increased use of performance-oriented packaging, the benefits of which are listed in their article on page 10.

We also hear from two members of Transport Canada in Ottawa: Dave Westman, who describes the forthcoming changes in packaging for dangerous goods, and Linda Hume, who provides the logic of referencing a standard and shows how this procedure makes life easier for the people who develop regulations and those

who must follow them.

Who better to comment on standards than a member of the Canadian Standards Association? Conrad Tucker enlightens us as to the process behind the writing of standards, in his article on page 7.

We haven't forgotten to consult the people with the best first-hand knowledge of container problems. Grant Churchill of Edmonton-based CEDA-Reactor Ltd. talks about some of the dangerous goods mishaps he has seen and helped to clean up, and reveals that the sum of spills caused by container failures adds up to one enormous dollar figure.

Bill Smith of APSS is the Viewpoint contributor for this edition, and our experts in the Coordination and Information Centre have written about the wonders and dangers of calcium hypochlorite in our regular product profile on page 14.

Insight is published quarterly by Alberta Public Safety Services (APSS). The publication aims to inform readers about current developments concerning topics which relate to the mandate of APSS: to prepare for, respond to and follow up on man-made or natural disasters in Alberta. This mandate includes activities in the areas of disaster services and management, as well as the handling, offering and transporting of dangerous goods.

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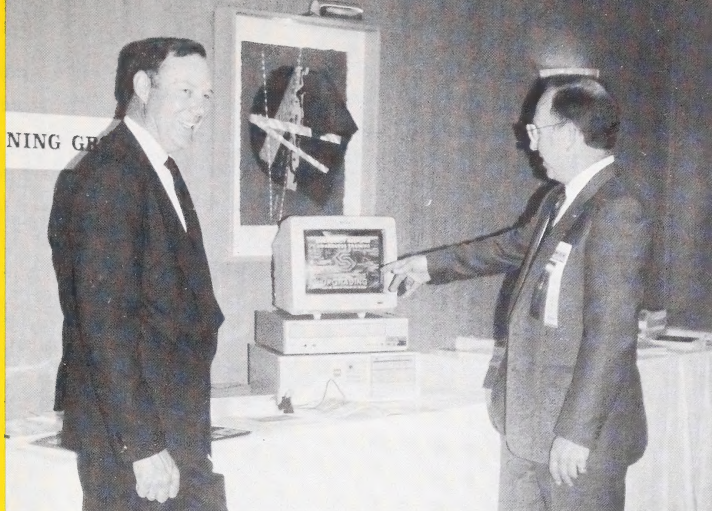
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On the cover: Response technicians "overpack" a drum leaking a dangerous good. Appropriate precautions are taken to ensure the workers' safety. Photo: Ceda-Reactor

Alberta
PUBLIC SAFETY SERVICES



The Hon. Ray Speaker, left, and Mark Egner, Managing Director of Alberta Public Safety Services, examine the latest in emergency response technology at the ER'91 Conference, held last May in Calgary

CANADIANA

DEC 18 1991

A discussion with Minister Ray Speaker

This issue of *Insight* deals with the packaging of dangerous goods. I remember the "831" spill, which was caused when a container broke. Was that incident one of the reasons for dedicating this issue to the packaging theme?

(Editor's note: on March 31, 1989, 800 litres of sodium dichromate leaked out of a truck on a stretch of Highway 831 north of Lamont.)

Yes, because that incident highlighted how important packaging is whenever dangerous goods are transported.

Are many dangerous goods accidents and spills attributed to faulty packaging?

Any accident which involves dangerous goods is a serious matter, and I know of one Alberta firm in particular that has responded to a large number of dangerous goods incidents either caused or aggravated by faulty or sub-standard packaging.

Can you cite a few examples of how poor packaging or package handling leads to mishaps?

Insecure loads are probably a major cause of dangerous goods accidents and spills. Using containers to carry products which the containers were not specifically designed for can also result in sig-

nificant spills and damage.

So then proper packaging is absolutely critical to the safe transportation of dangerous goods.

Of course. There is no point in regulating the marking of vehicles and ensuring that the drivers are properly trained if the goods themselves are to be shipped in containers which leak. Remember, a leaking container was the cause of the 831 spill.

Was anything ever done to ensure that the type of container which caused the 831 spill was eliminated from further use?

A Stop Order was issued very quickly after the spill, to prevent the use of that particular container in Alberta. As a matter of interest, this stop order was subsequently followed by a similar order from the federal government. It is vital to ensure that proper containers in excellent condition are used to ship hazardous products.

Is anything being done to standardize containers used for transporting dangerous goods?

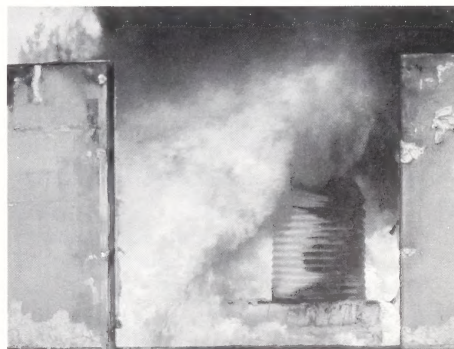
There have always been rules governing the transportation of gases, gasoline products, propane and other types of dangerous goods. But there are now well over 3000 designated dangerous goods that are transported on a regular basis

throughout the province of Alberta alone.

The federal government has been working with the United Nations to ensure that Canadian regulations conform to those adopted worldwide. Canada intends to bring in rules governing packaging, but it would be a waste of time to introduce regulations that apply only to Canada if we have to change these once the United Nations sets different criteria that will be used around the world.

As I mentioned, there are well over 3000 designated dangerous goods, each transported in varying quantities. It is not an easy task to devise detailed rules that will meet everyone's needs, but I am convinced that a universal set of standards that will be agreed to by every country will eventually be the preferred solution.

AECL RESEARCH



This accident and fire resistant overpack, developed by AECL Research (Atomic Energy of Canada Limited), can help safely transport PCBs and toxic substances. Here, the overpack withstands an 800 degree C fire.



The crack in this rigid intermediate bulk container caused the "831" spill (see Minister's article on page 3).

CEDA-REACTOR LTD.

Careful...your profits may be leaking

by Grant Churchill, CSSE, CRSP,
Corporate Loss Prevention;
Senior Coordinator,
CEDA Emergency Response Team,
CEDA-Reactor Ltd., Edmonton

Since its creation in July 1988, the CEDA Emergency Response Team has responded to over 200 dangerous goods road, rail and air incidents throughout western Canada. All of these incidents resulted in one way or another from poor packaging, particularly in the road and rail modes.

Causes of packaging related mishaps include:

- pails not placed securely on top of pallets
- single pails or cans not secured from tipping over during transportation
- plastic and metal pails breaking open during motor vehicle accidents
- pails improperly filled by the manufacturer or supplier
- containers neither manufactured to company standards nor designed according to safety standards

Though the list is actually much longer, the above are the most common errors and the ones

which have resulted in the highest clean-up costs.

Seven recent rail incidents which occurred just this year, involved the exact same product shipped from the U.S.A., where classification of some products is slightly different than in Canada. The product, which is corrosive when wet, was sent moist when it should have been sent dry. Furthermore the product was hygroscopic, and therefore by the time the shipments reached Canada, the 1-ton bulk bags were either leaking or damaged.

Vehicle transportation incidents can be divided into two categories: spills and motor vehicle accidents. The latter is by far the most common type of mishap, and usually results in damage to fuel tanks and, during the accident itself, occasionally damage to the chemical cargo. In a typical scenario, when loads such as 230-cubic-foot bulk containers are poorly chained down, the load can shift on a curve and tip the vehicle over. This causes a chemical spill.

The most costly and serious incidents are caused by:

- no secondary containment system in vehicles

- transporting dangerous goods in containers that leak or break open

Please see *Careful* on page 15



CEDA-REACTOR LTD.

This pail containing chromic acid ruptured and contaminated a 2.5 km. stretch of Highway 16X causing closure of one lane for two days.

Performance oriented packaging takes to the skies

by Neil McCulloch
Manager, Dangerous Goods
International Air Transport
Association, Montreal

(Editor's note: *The International Air Transport Association (IATA), a trade organization representing 202 airlines worldwide, has published regulations governing the shipment of dangerous goods by air since the 1950s.*)

Packaging requirements are perhaps the single most important component of all the regulations for the shipping of dangerous goods, by air or by any other mode. Imagine if all packagings could be guaranteed not to leak even a drop, there would be less need for labelling and documentation of dangerous goods shipments. However, even if such a packaging did exist, nobody could be 100 per cent certain it would never leak.

There are containers for radioactive materials that have survived an impact of several hundred tons, the sort of impact that might occur in a head-on train crash. How was this determined? An actual crash experiment with a train!

Normal packagings are not expected to stand up to that kind of punishment, which is just as well. Testing to such a high level of performance is very expensive and would use up a lot of trains!

The principle is a good one, however, and since early 1991, dangerous goods shipped by air have to be packed in Performance Oriented Packaging, or "POP" for short, packaging which has been manufactured, tested and certified according to the United Nations specifications.

For years, shippers of dangerous goods have added the packing group to their declarations. As the IATA Dangerous Goods Regulations explain, the packing group is an indication of the relative degree of hazard within a particular dangerous class or division.

For the shipper, that was once the end of the matter, but no longer. With the advent of POP, the packing group tells the shipper exactly what standard of packaging is required for a particular dangerous good. If the packaging does not meet the right standard, the airline will refuse the shipment.

Each mode of transport has its own special requirements for the transport of dangerous goods. Airplanes are self-contained envi-

"Airlines have always been extremely safety conscious. It was back in the 1950s that they developed the first set of standards for the shipping of dangerous goods by air."

ronments and their shipments are always intermodal and often international as well. Airlines have always been extremely safety conscious. It was back in the 1950s that they developed the first set of standards for the shipping of dangerous goods by air, including packaging. These standards were eventually adopted, modified and implemented in 1983 by the International Civil Aviation Organization, the UN body with responsibility for air transport, as the ICAO Technical Instructions.

In 1991, the last IATA specification packaging types were phased out and full UN specification packaging came into force. Now, the international standards for packaging are monitored and enforced by government.

Terminology for dangerous goods packaging, such as 1A1 steel drums and 4G fibreboard boxes, is now understood and applicable around the world. Packagings are clearly marked with a type of packaging code, the packing group they have been tested for and quantity limitations. However, there are still some bugs in the process. A 1A1 drum, for example, usually has its specification marking on the bottom. Airline cargo acceptance staff have found this a little difficult to check!

As before, the IATA Dangerous Goods Regulations set out in clear tabular form the types of packaging and size limitations for each dangerous good. A combination packaging may be required and UN specification inner packaging must be used, IP.2 for a plastic bottle, for example. A variety of outer packagings might then be used, most popular being a 4G fibreboard box. However, to be properly certified, the entire package as prepared for transportation must be tested, not just the fibreboard box alone.

IATA long ago realized that small quantities of certain dangerous goods could be shipped with a very high degree of safety if packaged securely. To accommodate this situation, the airlines allowed the use of "transitional", otherwise known as "T" packagings. These packagings did not need specific testing, but were required to be strong, sound and of good quality. As of 1991 these packagings are no longer allowed. Currently acceptable is the use of "limited quantity" provisions. The Dangerous Goods Regulations set these requirements out in the "Y"

Please see Performance on page 11



Cleaning up after a cylinder mishap.

Referencing standards in regulations: It's only logical

by Linda Hume
Surface Transport
Dangerous Goods Directorate
Transport Canada, Ottawa

Most people who are involved in developing regulations appreciate having a standard to reference. Referencing a standard makes writing regulations easier, ensures a smooth legal review and usually a non-contentious comment period. Indeed, from development to promulgation, a regulation that involves a reference to a standard is, all things being equal, a relatively uncomplicated exercise.

For those who are regulated, a reference to a standard can be a real boon in many ways, and the logic of referencing standards in regulations becomes even more evident.

CONSISTENT WITH CURRENT RESEARCH

Standards are normally developed as consensus documents. The participants are drawn from industry, inspection agencies, other interested parties and government, depending on the subject matter. Consequently, standards are usually up-to-date with current research and technical advances and with current industry practice and experience. As a result, the regulations that reference these standards are also up-to-date.

Standards focus on a specific subject matter while regulations are general, minimum requirements. Although some standards address highly technical and difficult topics, they are still written in a language that is understandable to those who are obliged to comply with them as a result of referencing in regulations.

FACILITATE CHANGE

Regulations that contain a reference to standards are more responsive to technical changes. If a standard changes, the amendment to the regulations may involve nothing more complicated than, for example, changing the date of issue of the referenced standard or changing the citation of the standard from a preliminary or provisional standard to a final, national standard.

ENHANCE COMPLIANCE

The consensus approach to writing standards means that a considerable amount of consultation has already been done with industry and other interested parties before any reference is even made in regulations. Furthermore, industry usually complies voluntarily with such a standard before it becomes mandatory, so that when a regula-

tion that references a standard comes into force, industry has very little gearing up to do. Referencing standards in regulations provides for uniform requirements and that, in theory, facilitates compliance and enforcement.

It should be noted that one standard can consolidate requirements or recommendations that may be found in several documents or sets of regulations. For example, one of the standards referred to in the *Transportation of Dangerous Goods Regulations*, CAN/CSA-B339-88, *Cylinders, Spheres and Tubes for the Transportation of Dangerous Goods*, dated February 1988, was developed by a committee that, as stated in the preface to the standard, "...made extensive use of the CTC Regulations, the Compressed Gas Association Codes of Good Practice and the US Code of Federal Regulations".

Standards, then, are extremely useful tools to work with not only for regulators but also for the regulated community. Two of the main standards writing organizations in Canada, the Canadian General Standards Board (CGSB) and the Canadian Standards Association (CSA) produce standards that can be sanctioned by the Standards Council of Canada as national standards.

(Editor's note: Please see the article by a CSA official on page 7.)



The hydrofluoric acid that was once inside this plastic container spilled and completely dissolved the cardboard box in which the container was placed.

Minimizing the risk of transporting dangerous goods

by Conrad Tucker
Canadian Standards Association
Toronto

Every day, Canada's roadways, airways, railways and waterways act as thoroughfares of risk, as tankers, aircraft, railcars and ships containing dangerous goods carry their hazardous cargo to local, national and international destinations. Since the threat these goods pose to safety is enormous, what is being done to protect us and our environment from the hazards associated with spills, leaks and other potential mishaps?

A combination of industry and government know-how and action, along with the contribution being made through the preparation and use of CSA consensus standards, is helping to minimize the risks.

The federal government, in recognition of the need for greater public and environmental safety, passed the Transportation of Dangerous Goods Act in 1980 with pursuant regulations (first published in 1985) that were to become applicable nationwide.

At the request of Transport Canada's Transport Dangerous Goods Directorate, a number of consensus standards have been or are being published by the Canadian Standards Association

(CSA). These standards will be adopted by reference (often simply a one-line reference) in the Transportation of Dangerous Goods (or TDG) Regulations.

Various parts of the Regulations are being published progressively as they are developed and legislated, as announced in Canada Gazette, Part II. The Regulations may adopt these standards with certain exceptions or additional requirements and should, therefore, be consulted to determine where they differ from the requirements in the standards.

André Charest of Canadian Liquid Air Ltd., and former Chairman of the Technical Committee on Cylinders, Spheres and Tubes for the Transportation of Dangerous Goods, says, "Ideally, in a technological society such as ours, consensus standards and codes of good practice should be sufficient to maintain a high degree of individual and public safety.

"Unfortunately, conditions are never ideal and, in a competitive world, some regulations are necessary to set the basic rules. The number and extent of these regulations should be as limited as possible.

"I consider the TDG Directorate's approach of integrating by reference consensus standards in its

Regulations as the best compromise. Standards such as B339 can evolve and adapt to our changing world faster than regulations because they are not submitted to the same constraints, and are prepared by the individuals who have the greatest interest in them. It is a lot easier for TDG to approve an updated standard than to write the same material into regulations."

THE ROLE OF THE CSA

The Canadian Standards Association prepares and publishes TDG standards, in accordance with the CSA Regulations Governing Standardizing by CSA Technical Standards Steering Committee on Material Handling and Distribution, chaired by D.W. Francis.

Members of the subcommittees have responsibilities and expertise either as manufacturers and users, or in related areas that include testing and inspection of containers and materials, materials production and regulatory interests.

Manager of Distribution Services for DuPont Canada Inc. and Vice-Chairman of the Subcommittee for CSA Standard B621, John Tweddell, also endorses the consensus process of the standards. "I much prefer this process rather than Transport Canada just writing regulations and saying 'here they are, now live by them'. There would be consequences for the chemical industry," continues Mr. Tweddell. "The consultative process provides a good forum for resolving problems and finding solutions to make it

Please see Minimizing on page 9



**Well
secured
loads reduce
the risk of
accident.**

Legislation beefs up safety standards

by Dave Westman
Senior Specialist, Packaging
Transport Canada, Ottawa

Increasingly, packaging is becoming the focus of discussion when talk turns to the transportation of dangerous goods. Little wonder, given the changes that are presently occurring around the world.

The most significant changes originate with United Nations (UN) recommendations calling for performance testing of all non-bulk packaging used in dangerous goods transport. This is a relatively new concept in dangerous goods packaging.

The UN recommendations have already been adopted by the international marine and air regulatory authorities. Canada, Europe, Australia and the United States are in the process of incorporating the recommendations into their domestic dangerous goods packaging regulations.

In Canada, the UN recommendations form just one part of what will become national regulations for non-bulk and bulk packaging applying to all modes of transport.

The Canadian regulations are to be published in two stages, beginning with non-bulk. The most important

feature of these regulations will be the incorporation by reference of national packaging standards written by the Canadian Standards Association (CSA) and the Canadian General Standards Board (CGSB). The standards, based on existing North American regulations and the new UN recommendations, will apply both to manufacture and to use.

Although the regulations have been written to minimize impact on industry, there are some aspects of the non-bulk standards and the regulations implementing them that should be noted by manufacturers, shippers and enforcement agencies.

MANUFACTURE

The Transportation of Dangerous Goods (TDG) regulations (Part 6) will make reference to a total of 85 CSA and CGSB standards for the design and construction of cylinders, drums, bottles, bags and boxes. These will be based on existing container "specifications" found in the Canadian Transport Commission's "Regulations for the Transportation of Dangerous Commodities by Rail" and the United States Department of Transportation's "Hazardous Materials Regulations".

These regulations are for packagings

that have been commonly used for decades in the transportation of dangerous goods throughout North America. The standards contain detailed requirements for material, dimensions, capacity, closure and marking for a wide variety of non-bulk packaging types. The regulations simply state that a packaging marked in accordance with a standard must meet the requirements of that standard.

Those familiar with the Canadian Transport Commission or US Department of Transportation specification containers, (e.g. the CTC 17E steel drum) will find few changes from the old specifications other than the change to the Transport Canada marking "TC".

The regulations will also refer to two CGSB non-bulk standards conforming to the new UN recommendations. In these standards, a minimum performance level is set for packaging through the use of drop, stacking and internal pressure tests. There are no restrictions on the materials of construction, dimensions or capacity, thus providing more design flexibility than the TC specifications.

Packaging manufacturers will find that these standards require registration of the design with Transport Canada and a quality assurance program for the manufacture of packaging and containers.

Determining compliance with the manufacturing standards is a matter of comparing a packaging's physical

characteristics to those required by the standard (for Transport Canada) or the design registered with Transport Canada (for the UN).

USE

The TDG regulations (Part 7) will require all packagings to be "designed, constructed, filled and closed" to withstand the normal transportation environment. Three standards that satisfy this requirement for the selection and use of Transport Canada and UN non-bulk packagings will be incorporated by reference. These standards, based on existing national and international regulatory requirements, match commodities with the Transport Canada or UN packaging types and sizes suitable for their safe transportation by road, rail and ship.

Use of the standards for explosives and gases will be mandatory. Compliance can be determined by comparing the packing method to that prescribed by the standard.

The regulations for flammables, oxidizers, poisons and corrosives refer to a single standard but will be written in a way that will make the use of the standard optional. Shippers will have a choice: the use of a packing method contained in the standard or a method of their own choosing that satisfies the requirement to be "designed, constructed, filled and closed" to withstand the normal transportation environment. Compliance can be determined by comparing the packing method to that prescribed by the standard where the standard has been used.



THE FUTURE

As of January 1991, UN packaging is required for shipments of dangerous goods by air transport and for international shipments by marine mode. The US Department of Transportation, in its latest rulemaking, requires that all dangerous goods packaging manufactured after 1994 must be to UN standards and after 1996, all dangerous goods will be required to be transported in UN packagings. As a result, the trend is toward the exclusive use of the UN performance packaging standard.

Canada is incorporating both the "old" and "new" packaging standards into its domestic regulations to facilitate the transition. There is no plan to require the exclusive use of UN packaging in Canada at any point in the future.

The introduction of Canadian packaging standards is the final stage in the implementation of the dangerous goods regulations. It reflects a major step in the attainment of a transport system in which the safe handling of dangerous goods is the primary goal.

(Editor's note: A list of the standards, both bulk and non-bulk, along with a list of suppliers of packagings, is available from the TDG Directorate at Transport Canada. Requests should be addressed to "Packaging", facsimile (613) 993-5925.)

Nickel sulfate leaking from its container onto a handful of lime.

CEDA-REACTOR LTD.

Minimizing the risk of transporting dangerous goods

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workable for both government and industry."

The members of the above-mentioned committee agree that standards developed by consensus are practical, current with respect to technology and industry practices, useful and generally acceptable to all interested parties. Adds Ken Kendall of the TDG Directorate, and a subcommittee member of CSA Standard B623: "Instead of three or four sources, you need only refer to one standard."

The following CSA standards have been approved as National Standards of Canada:

- CAN/CSA-B339-88, "Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods" covering design, construction, inspection and testing of containers
- CAN/CSA-B340-M88, "Selection and Use of Cylinders, Spheres, Tubes and Other Containers for the Transportation of Dangerous Goods, Class 2"

The following have been published as preliminary standards:

- B621, Selection and Use of Highway Tanks, Portable Tanks, Cargo Compartments and Containers for the Transportation of Dangerous Goods, Classes 3, 4, 5, 6 and 8, in Bulk by Road
- B623, Selection, Handling, and Use of Intermodal Portable Tanks for the Transportation of Dangerous Goods, Other Than by Air for Classes 3, 4, 5, 6, 8 and 9.1.
- B620, Highway Tanks and Portable Tanks for the Transportation of Dangerous Goods- a new edition replacing the previously listed B338 Standard by the same name.
- B622, Selection and Use of Highway Tanks, Multi-unit Tank Car Tanks and Portable Tanks for the Transportation of Dangerous Goods, Class 2, by road.

Assessing the impact of proposed container amendments

by J.T. Pegg, *Responsible Care Manager*
R.D. Jensen, *Purchasing Supervisor*
Nalco Canada
Burlington, Ontario

Nalco Canada Inc. is a Canadian specialty chemical manufacturer. We regularly offer dangerous goods, as defined in the TDG regulations, for road transport within Canada.

We support the introduction of uniform standards and regulations that will apply to the packaging of all classes of dangerous goods offered for transport in Canada.

Currently there are no clearly defined packaging requirements applying to the transportation of all classes of dangerous goods by road. Canadian regulations exist only for shipments of three classes of dangerous goods: Class 1 (explosives), Class 6.2 (infectious substances) and Class 7 (radioactive).

Companies like ours which move Class 3 (flammable liquids), Class 4 (flammable solids), Class 5 (oxidizers and organic peroxides), Class 6.1 (poison), Class 8 (corrosive) and Class 9 (miscellaneous dangerous goods), utilize a variety of con-

tainers for road shipments. The choice of containers is generally based on packing rules and container specifications as outlined in the regulations for the Transportation of Dangerous Commodities by Rail (also known as the "Red Book").

While the emphasis has been on the use of specification packing as outlined in the Red Book, Canadian shippers have used a variety of packagings for the shipment of dangerous goods via road carrier. Shippers have used specially designed containers, or containers based either on the Canadian freight classification packaging rules for non-dangerous goods or the U.S. federal regulations.

The proposed amendment (schedule 14) to the TDG regulations will provide shippers with explicit guidelines for the packaging for shipment by multi-modal transport in Canada of all classes of dangerous goods. With the proposed amendments, packaging standards will exist that can be applied to road, rail and domestic marine shipments.

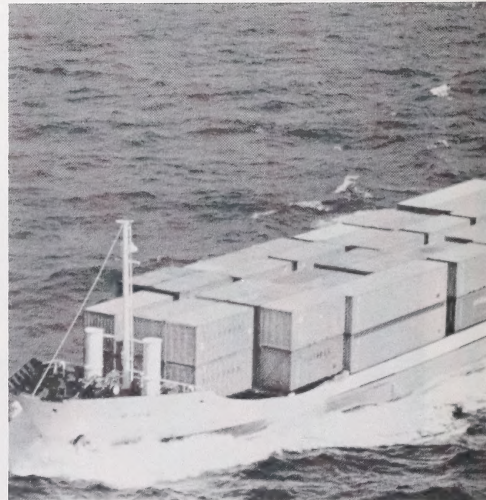
Allowances have been made in the proposed legislation for the continued use of specification packaging conforming to the Red Book requirements or to existing specially

designed containers that have a proven track record.

Discussions our company has had with government officials and Canadian container manufacturers

"The proposed legislation for the packaging component of the Transportation of Dangerous Goods by road carrier is long overdue."

have indicated that there will be an increasing shift toward the use of performance-oriented packagings as outlined in Standard CAN/CGSB-43,



150-M89, Performance Packagings for Transportation of Dangerous Goods.

In our opinion, performance packaging offers the following advantages for both shippers and container manufacturers:

1. Provides secure containment of dangerous goods
2. Package performance standards are clearly defined
3. Allows for innovation in package design
4. Quality control standards are specified

We think that container manufacturers will welcome the new regulations as an opportunity to compete and be more innovative in design. However, they may have concerns regarding high short-term expenses resulting from Quality Assurance and testing requirements.

We do not expect the legislation to have a significant impact on the shipping community if containers are purchased from a supplier who has complied with performance packaging registration requirements. The manufacturer has incurred a significant expense in the comple-

tion of the registration process, but the shipper will be assured of obtaining a safe package for the containment of dangerous goods. In fact, container manufacturers are already supplying performance-oriented packaging to the market. These packages will meet proposed legislative requirements for multi-modal shipments of dangerous goods.

The proposed legislation for the packaging component of the Transportation of Dangerous Goods by road carrier is long overdue. Legislation will provide a consistent and uniform method of packaging dangerous goods for road transport, and this will lead to better protection of communities and the environment from accidents involving the transportation of dangerous goods.

The proposed amendment (schedule 14) to the TDG regulations will provide shippers with explicit guidelines for the packaging for shipment by multi-modal transport in Canada of all classes of dangerous goods.

Performance oriented packaging takes to the skies

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packing instructions. Limited quantities do not require UN specification packagings although in practice the packaging must be of equivalent quality. Some countries however, including France, Italy, and Germany, do not permit the use of limited quantities.

Something as complicated and far-reaching as the adoption of POP requirements could not be expected to be without problems, and there are indeed some still to be worked out. Testing of combination packagings is particularly difficult, especially for the "one-off" shipments that many shippers handle.

It is expected that there will be new solutions in this area as of 1992, and some countries, notably Canada, the United States and Great Britain have introduced "variations" as interim solutions, the so called "V" spec packaging, but to date these have proven useful only for domestic shipments.

Shippers can expect the packaging requirements to evolve and change to accommodate their problems with shipping dangerous goods by air. However, as the representative of one international carrier put it, "If at times some of the procedures and regulations imposed seem out of place in this modern world, we will always insist that we will not relax our efforts to fly safely and we will not apologize for making safety our highest priority."

(Editor's note: Readers are welcome to contact Neil McCulloch for more information. Telephone: (514) 844-6311; Fax: (514) 844-7711)

¹ Individual states may have additional regulatory requirements. These are notified to ICAO as "variations" for inclusion in the Technical Instructions. The IATA Dangerous Goods Regulations contain the very latest state and operator variations.



This spill closed down the northbound lane of this highway for three days.



It's not necessarily the container at fault: An argument for human checks and balances

by Bill Smith
Chief Inspector, On-Highways
APSS

(Editor's note: The following article summarizes a key principle expressed throughout this edition of Insight. Neither technical packaging wizardry nor all-encompassing safety regulations can replace awareness and careful attention to detail on the part of employees and managers responsible for transporting dangerous goods.)

Public apprehensions notwithstanding, most dangerous goods are handled and transported safely because industry realizes that it is in their own and society's best interest to do so.

Manufacturers, shippers, handlers and carriers of dangerous goods are intensely aware of the hazards

involved with these products and the potential for damage to life, health, property and the environment caused by spills. As a safety precaution, these companies are heavily regulated and the proposed implementation of the UN packaging requirements in Canada goes a long way to reducing the frequency of incidents involving spills of dangerous goods.

THE STANDARDS ARE COMPREHENSIVE

The United Nations recommendations for the safe transportation of dangerous goods include general packaging requirements for material, construction, size and container testing. In Canada, existing and proposed packaging standards, detailed in the appropriate National Standards, reflect the UN recommendations. For example, the Canadian dangerous goods regula-

tions require all non-bulk UN-marked packaging manufactured for filling in Canada to conform to the "performance packaging for the transportation of dangerous goods" as detailed in CAN/CGSB 43.150-M89.

The approved standards, along with other standards about to be adopted into the Transportation of Dangerous Goods legislation, will

Over 80% of dangerous goods incidents can be attributed to human error.

require packaging to be so designed, constructed and the contents limited so that under normal handling and transporting conditions the packaging maintains its

integrity, and prevents the release of dangerous goods or other significant chemical reactions within the packaging itself.

While both the classification and quantity of dangerous goods are instrumental in the choice of type and size of container, all packaging performance standards call for industry to demonstrate a thorough understanding of the dangerous goods legislation as well as the transportation cycle code of practices.

In addition, consignors must question how the dangerous goods will be handled and what conditions the consignment will be subjected to in the normal course of transport.

...AND STILL ACCIDENTS WILL HAPPEN

An analysis of road mode incidents, prepared by the Dangerous Goods Control Division of Alberta Public Safety Services, indicates that over 80% of dangerous goods incidents can be attributed to human error. Some of the more common errors include improper packaging, loading, bracing, unloading, or simply not following the rules of the road. These failures compromise the UN recommended package designs.

Room for improvement exists in the following areas:

- the training of handlers, drivers, maintenance personnel and other

employees involved in transporting dangerous goods

- management practices such as hiring personnel and scheduling work
- equipment maintenance
- dangerous goods compliance
- safety audits

Increased awareness and attention to all of the above points will certainly reduce the possibility of dangerous goods incidents.

INITIATIVES FOR ENHANCED SAFETY

One tool that might critically reduce accident rates is a review of the cargo securement requirements presently incorporated into the Commercial Vehicle Safety Alliance's North American out-of-service criteria.

Currently, specifications for cargo tie-downs, chains and other securing devices, and the inspection of these items are included in roadside

Second responders to dangerous goods incidents in class at the APSS Training School



Loose loads are accidents waiting to happen.

inspections. A motor carrier audit and corrective procedures, if required, will reduce the more common causes of accidents such as cargo shift, puncturing by other cargo, improper loading or rollover.

A pilot program in APSS, using a detailed incident analysis process, has highlighted some significant features that can be used to prevent accidents. Information gathered in this way is used to initiate regulatory action, or simply provide advice to shippers and carriers.

Results of this review program include the removal of an intermediate bulk container from dangerous goods service in North America due to its high failure rate. In addition, a major chemical motor carrier now prohibits the use of a secondary highway with a high accident profile, while another motor carrier has implemented a driver policy and procedure manual dealing with pre-trip load inspections and periodic stops for further checks on the load security.

As legislators, we can impose a number of requirements in the form of safety markings, documentation, and packaging standards on industry. But in the end, it is how these requirements and standards are implemented, and the human checks and balances that will go a long way to reducing the frequency of dangerous goods incidents.



Calcium Hypochlorite

Everyone uses a little calcium hypochlorite now and then. Deep-woods hikers use dry chlorine bleach, as the chemical is otherwise known, to make foul water safe, clean and drinkable. Jacuzzi owners use the product to control the growth of bacteria and slime in their hot tubs. Many industries, including pulp and paper, use it as a bleaching agent.

Calcium hypochlorite is a white, crystalline solid with a strong chlorine odour. It is well known as a stable source of chlorine, and is usually found in granular or tablet form. A close relative of common household bleach, calcium hypochlorite is soluble in water and forms clear colorless solutions.

$\text{Ca}(\text{OCl})_2$, as calcium hypochlorite is known, is manufactured by adding chlorine to a slurry of lime and caustic soda. The resulting precipitate is collected and dried under vacuum. This produces a concentrated or high grade product containing over 70 per cent available chlorine, with up to 3 per cent lime as an impurity. Industries which require a source

of chlorine to bleach their products and find this impurity to be a problem may choose another hypochlorite, such as lithium hypochlorite, or a different type of bleach, such as chlorine dioxide.

Many years ago, before the development of the liquid chlorine industry, the only means of transporting chlorine was as dry bleach. The common practice was to absorb chlorine onto hydrated lime, forming a stable, easy to handle, dry product with approximately 35 per cent available chlorine. This chemical is still in use today as an ingredient in powdered cleansers. The term "available chlorine" refers to the oxidizing (bleaching) power of the product as compared to pure chlorine.

Because of its many useful properties, the search for a way to produce a cheap, easy to handle, stable source of chlorine has existed for centuries. Hypochlorite has long been known to kill bacteria harmful to man — simply adding a small amount of hypochlorite to wastewater and drinking water can help eliminate the killer diseases of cholera and typhoid. In addition, it was sought after as a bleaching aid in the textile and paper industries; the term "bleach" means to whiten.

Calcium hypochlorite, like other hypochlorites, is a powerful oxidizing agent and as such is a very reactive chemical under certain conditions. Contact with any other materials or chemicals should be avoided, as dangerous

THE CLASSIFICATION AND PIN NUMBERS FOR CALCIUM HYPOCHLORITE ARE AS FOLLOWS:

SHIPPING NAME	CLASS	PIN	PACKING GROUP
CALCIUM HYPOCHLORITE, dry (more than 39% Cl)	5.1(9.2)	1748	II
CALCIUM HYPOCHLORITE, dry (10% to 39% Cl)	5.1(9.2)	2208	II
CALCIUM HYPOCHLORITE, hydrated (5.5% to 10% water)	5.1(9.2)	2880	II

Note:

High grade calcium hypochlorite (PIN 1748) has a special provision 48 associated with it which prohibits its transportation as a bulk shipment.

chemical reactions, even explosions, are possible. Ignition and fire can occur when dry calcium hypochlorite comes in contact with combustibles such as gasoline, methyl alcohol, greases and organic compounds. Highly toxic fumes of chlorine gas are produced when the hypochlorite mixes with acids such as muriatic and sulphuric.

First responders fighting fires involving calcium hypochlorite must wear full self-contained breathing apparatus, rubber suits, gloves and boots. Because dry hypochlorite can react with cloth, this material must not be worn either by first responders or by clean-up crews.

Calcium hypochlorite is a toxic, irritating material. The dust produced by the dry material is extremely irritating and harmful. A dust mask is therefore essential whenever handling this material. Concentrated solutions can damage skin tissue, and the chlorine vapours can harm the respiratory tract. Proper safety apparel must be worn at all times. Care should be taken to prevent the dry product from getting wet, as a dangerous evolution of heat and toxic gases can result. The dry product must therefore be stored in a cool, dry place away from other chemicals, especially combustibles.

The Transportation of Dangerous Goods Regulations lists calcium hypochlorite as a Class 5.1 oxidizer with a subsidiary classification of 9.2 (environmentally hazardous). There are three listings in the Regulations for calcium hypochlorite based on its physical state and available chlorine content.

News from the Major Industrial Accidents Council Of Canada (MIACC)*

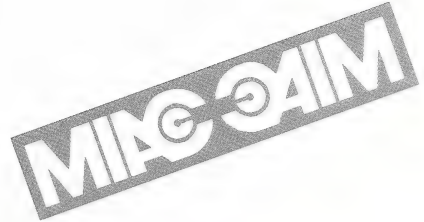
MIACC has changed its name and moved into new premises located in downtown Ottawa.

MIACC is now located at:

265 Carling Avenue
Suite 600
Ottawa, Ontario
K1S 2E1

Tel: (613) 232-4435
Fax: (613) 232-4915

*Formerly the Major Industrial Accidents Co-ordinating Committee.



Careful... your profits may be leaking

continued from page 4

- improper arrangement of dangerous goods on vehicles (stacking small containers on top of pallets)
- containers and pallets shifting on curves and bumps in the road
- small containers not secured to provide more stability during shipping
- insecure loading of dangerous goods
- containers breaking open, usually the 20L plastic and metal ones, and falling off the vehicle. The plastic pails have split; the lids on the metal pails have failed
- improper filling of containers: spills occur during filling, the spillage on the vehicle is not cleaned up and during transportation, the product leaks off the vehicle, causing a spill or contamination of the environment

Dangerous goods spills cost the province of Alberta huge amounts of money every year. The problem is that in some cases dangerous goods are still being shipped

in containers that were originally designed to hold safe products. These containers can adequately hold dangerous goods as long as they are not dropped, tipped, squashed, heated, overly cooled or bumped.

In some cases, it takes only a very small amount of a spilled dangerous good to harm the environment, contaminate residential streets or highways, cause the evacuation of towns and raise everyone's stress level. Better containers and a focus on the safe transportation of dangerous goods by all concerned will save our society billions of dollars and prevent billions of headaches.

Erratum

Insight regrets an error which appeared in the Product Profile of our September 1991 edition. Carbon dioxide and carbon monoxide are combustion, not combustible products.

Transporting Bio-Medical Fluids

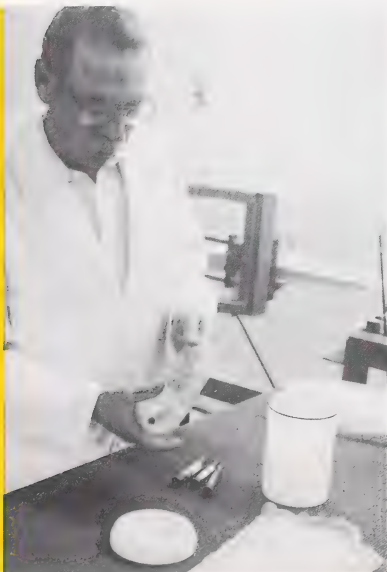
In the Age of AIDS, how are blood samples and other medical samples shipped between hospitals and labs? Bert Spencer, Vice-President, Manufacturing, of Safe-T-Pak, an Alberta company which is one of only three companies in Canada specializing in packaging for the transport of medical samples, displays the process of preparing test tubes for transport.

In Bert's experience, hospitals and laboratories were reluctant to introduce specialized packaging for the transportation of biomedical fluids, until national regulations were implemented.

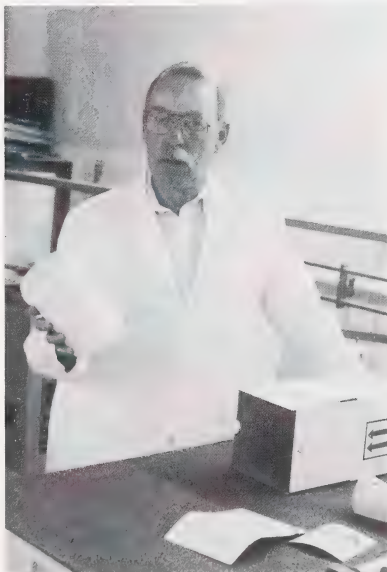
"Now we have a law in place," he says, "and in my opinion, the law is a reasonable burden on the health care system, when one considers all the people who may come into contact with an infec-

tious substance. It's not just the carrier operator at risk, but in case of an accident, people from the response teams, from the fire, police and ambulance services who will also be in danger of infection."

INFECTIOUS MEDICAL SAMPLES

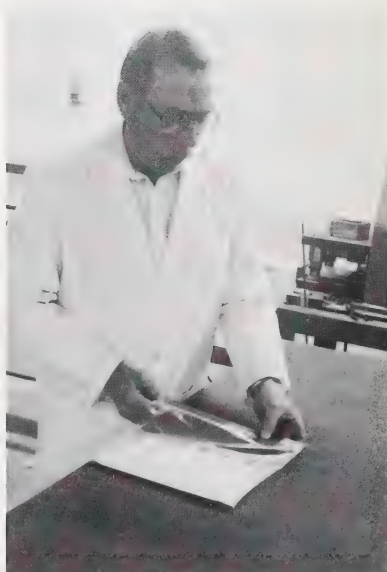


Bert wraps a test tube containing an infectious sample in shock and impact resistant material.



The tightly wrapped test tubes are then inserted into a leakproof secondary container which is placed in approved outer packaging.

NON-INFECTIOUS MEDICAL SAMPLES



Though these samples are not infectious, a high degree of care must be taken to avoid breakage of the fragile test tubes. Bert wraps the test tubes as in the first photo, then places them in a shock and impact protective pouch.



Recent Acquisitions in the Library:

A Selected Bibliography of Materials Available from the Alberta Public Safety Services Library

*Compiled by Grace Waskiewicz
Library Technician*

To borrow material listed, send an interlibrary loan request form to Alberta Public Safety Services Library (AEPS), 10320-146 Street, Edmonton, Alberta, Canada T5N 3A2. Materials located in the Coordination and Information Centre, at our Training School, the Government Emergency Operations Centre or our Reference Collection cannot be borrowed but can be referred to in the Library.

Cross, Frank, Howard E. Hesketh, Kay D. Rykowski. **Infectious Waste Management.** Lancaster, Penn.: Technomic, 1990. 150 p.

RA 969.45 .C76 1990, MAIN LIBRARY

Includes bibliographical references and index.

Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Association of American Railroads, 1989. 965 p.

HE 199.5 .D3 E431 1989, MAIN LIBRARY

Includes index.

Emergency Planning for Industry. Toronto: Canadian Standards Association, 1991. 58p. T10.7 .C362 E437

Gearing Up for Safety : Motor Carrier Safety in a Competitive Environment. Washington, D.C.: U.S. Government Printing Office, 1988. 188 p.

HE 5614.2 .G42 1988, MAIN LIBRARY

Includes bibliographical references.

Hazardous and Industrial Wastes. Proceedings of the Twenty-Second Mid-Atlantic Industrial Waste Conference. Edited by Joseph P. Martin, Shi-Chieh Cheng and Mary Ann Susavidge. Lancaster, Penn: Technomic, 1990. 793 p.

TD 811.5 .H P76 1990, MAIN LIBRARY

Includes bibliographical references and index.

A compilation of papers presented by the Mid-Atlantic Industrial Waste Conference participants. The purpose was to exchange ideas and information on dealing with modern industrial society production by-products. Emphasis on site remediation and prevention of uncontrolled contamination releases. The papers included are organized into sections consistent with the sessions of the three-day conference.

International Maritime Dangerous Goods Code. Consolidated edition. London, England: International Maritime Organization, 1990. 1 volume.

HE 199.5 .D3 154 v.1, CIC

Moran, Carmen. **Humour as a Coping Strategy in the Emergency Context : Humour and the Emergency Worker.** Lidcombe, N.S.W.: Disaster Management Studies Centre, 1990. 14 leaves.

HV 555 .A7 M67 1990, DSS

continued on page 18

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Performance Packaging for Transportation of Dangerous Goods. Ottawa: Canadian General Standards Board, 1989. 36 p.

T 10.7 .C36 D3672 1989, CIC-S

Recommended Practice on Shipping Documentation for the Transportation of Dangerous Goods. Rexdale, Ont.: Canadian Standards Association, 1990. 41 p.

T 10.7 .C362 D62 1990, CIC-S

Rigid Polyethylene Intermediate Bulk Containers for the Transportation of Dangerous Goods : Materials Handling and Distribution. Toronto: Canadian Standards Association, 1989. 20 p.

T 10.7 .C362 R53, CIC-S

Stutz, Douglas R., Robert C. Ricks, Michael F. Olsen. **Hazardous Materials Injuries : Handbook for Pre-Hospital Care.** Greenbelt, MD.: Bradford Communication Corp., c1982. 274 p.

RD 97.8 .H3 S79 C.3, CIC

Designed to present protocols for the use of paramedical personnel and EMTs in the field prior to transport to the appropriate medical facility for treatment. The book contains three sections discussing procedures for the care of the radiation victim, biological hazards and chemical hazards.

The authors don't intend to provide all the answers, since field situations are always more complex.

Technical Instructions for the Safe Transport of Dangerous Goods by Air. Montreal: International Civil Aviation Organization, 1990. 1991-1992 ed. Various paging.

TL 720.7 .T42 1991, REF

Dangerous Goods Course Information: NAIT and SAIT

TDG FOR THE INSTRUCTOR

This course is designed to prepare the participant to become an accredited instructor. Detailed instructions on all parts of the TDG Act and Regulations are provided, including workshops on application, classification, labelling, placarding and the preparation of documentation. Instruction on

effective training delivery is also included.

Successful candidates will be accredited as TDG Instructors by Alberta Public Safety Services (applies also in British Columbia).

Course length: 5 days

Course fee: \$495

1992 COURSE DATES:

SAIT

January 20-24

February 3-7*

April 6-10

June 1-5*

June 15-19

NAIT

January 27-31

April 13-17

June 8-12

Courses run from 8:30 a.m. until 4:30 p.m.

* Course at Pacific Marine Training Institute, North Vancouver

TDG Regulations may be purchased from NAIT or SAIT if required.

THE ALBERTA ENVIRONMENTAL DIRECTORY - Fourth Edition - 1991

Alberta Environment is involved in the development of this directory to further support communication and networking on environmental issues. We endorse it as the best source of information on who is doing what in regards to environmental issues in Alberta.

The Directory lists 350 organizations and agencies involved in environmental issues, services and activities in Alberta. It is extensively cross-indexed: alphabetically; by environmental issue; and by organization type. Each listing provides address and contact information, phone numbers, electronic mail I.D., details on the nature and structure of the organization, its purpose and the major environmental services provided.

The Alberta Environmental Directory is available from The Pembina Institute, Box 7558, Drayton Valley, T0E 0M0, phone: 542-6272. Cost: Institutions - \$30.00 (purchase orders and invoice requests accepted), Individuals or non-profit voluntary organizations - \$15.00 (pre-paid only). Bulk rates are available.



1991-1992 Course Schedule Alberta Public Safety Services Training School

December 3-5

#9117 Special Indian Bands
Program Management

December 11

#9115A Media Training Course
for Senior Staff of Alberta
Research Council

January 20-23

#9118 Emergency Site
Management

January 20-23

#9119 Emergency Public
Information Officers

February 11-13

#9120 Disaster Health
Services Seminar

February 18-20

#9121 Municipal Disaster
Services Program
Management

March 2-6

#9122 Rescue Leaders

March 18-19

#9123 Disaster Social
Services

**For further information,
contact:**

Judith Hughes
Director of Training
Alberta Public Safety Services
10320 - 146 Street
Edmonton, Alberta T5N 3A2
(403) 422-0346

Announcement

The APSS Training School is pleased to introduce an enhancement to its rescue training program. The Fire Fighter Level 1 course taught by the Alberta Fire Training School can now serve as a prerequisite to the Rescue Leader's course, taught at the APSS Training School.

This modification will allow fire fighters to have greater access to the Rescue Leader's course at APSS. Furthermore, the new arrangement paves the way for greater liaison between the two training schools.



PUBLIC SAFETY SERVICES

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Inside this issue:

EVERY DAY, CANADA'S ROADWAYS, AIRWAYS, RAILWAYS AND WATERWAYS ACT AS THOROUGHFARES OF RISK, AS TANKERS, AIRCRAFT, RAILCARS AND SHIPS CONTAINING DANGEROUS GOODS CARRY THEIR HAZARDOUS CARGO TO LOCAL, NATIONAL AND INTERNATIONAL DESTINATIONS. SINCE THE THREAT THESE GOODS POSE TO SAFETY IS ENORMOUS, WHAT IS BEING DONE TO PROTECT US AND OUR ENVIRONMENT FROM THE HAZARDS ASSOCIATED WITH SPILLS, LEAKS AND OTHER POTENTIAL MISHAPS?

excerpt from

**MINIMIZING THE RISK OF
TRANSPORTING DANGEROUS GOODS**

Story on page 7
